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PAPERS

IN

MANUFACTURES.

The GOLD MEDAL *of the Society was this Session voted to* GEORGE WHITWORTH, *Esq. of Coxwold, near Castor, Lincolnshire, for his Exertions in Manufacturing Ropes and Sacking from Sheep's Wool, to answer the Purpose of similar Articles made from Hemp.*

The following Communications were received from him, and Samples of Ropes and Sacks thus Manufactured are preserved in the Society's Repository.

SIR,

HAVING been so happy as to form from long sheep's wool two descriptions of manufactures, namely, worsted rope, and woollen sack, I conceive their extended use will be of great national benefit. I beg leave, therefore, to offer specimens of both these articles to the Society's attention; and if they meet their approbation, I shall be convinced that I have done my country a service. I wish to throw them freely open to the public, conceiving that, though I might benefit myself by a more selfish conduct, yet by diffusing the manufacture generally, I shall render great service to many others, which, with a good man, should ever be the first consideration.

Any particular information which the Society may require upon the subject, I will furnish with pleasure.

I have the honour to be, Sir,

Your faithful Servant,

GEORGE WHITWORTH,

Cuxwold, near Castor,
Lincolnshire, March 2, 1808.

To C. TAYLOR, M. D. SEC.

SIR,

SINCE I had the honour of addressing the Society, I have received much information from many respectable men in various departments, and I am encouraged to believe that woollen sacking and cordage will be found more generally useful than I had even hoped.

My first expectations led me to suppose they would be adopted by persons engaged in agricultural pursuits, and other departments immediately connected therewith, and that the woollen sacks would answer for the corn factors, in Mark Lane, instead of those made of hemp; and I was convinced by all the persons I advised with, that even to succeed so far would, at the present crisis, be productive of great and happy consequences to this country. I am now led to see this business in a more important light, and think I may now venture to calculate upon these articles not being used merely by farmers as a substitute for hemp, in order that hemp may be spared for naval purposes, but I have reason to hope they will in some cases have advantages over it. Worsted ropes for breechings of guns will, from their great elasticity, probably be found more to be depended upon, by yielding in some degree to the recoil of the gun, and less liable to break than hempen ropes: they will also be well calculated for running rigging in particular situations. According to Mr. Luccock, who is, I believe, our best authority, Great Britain produces about 137,000 packs of decidedly long wool, each of 240 pounds weight, and, I believe, full two-thirds of this is at this moment in the hands of the farmers and wool staplers, independent of the quantity now in the first processes of manufacture only; and the time of shearing is fast approaching. A great deal of short wool may be used in manufacturing sacks, and I am of opinion that the manufacturers would gladly devote 15,000 tons to make these articles, particularly when it is known that the woollen ropes, when worn out, will be again useful as wool to the manufacturers, and that it will then serve as well for coarse woollens as if it had not been made into ropes. It occurs to me that a great quantity of hemp will be required to be grown at home, unless we adopt these manufactures; and at a moderate calculation, 15,000 tons of hemp would require more than 7,000 acres of land to produce it; and which quantity of land would produce more oats than would half supply with them this metropolis, besides furnishing many other articles.

The first cost of these ropes will, by their being made from combed wool, be about three pence per pound dearer than hempen ones, but the difference will be more than twice recompensed by the superior value of the old material after being employed, which I presume will, under all circumstances, be worth nearly two-fifths of the original wool.

I speak of the worsted rope, because I have manufactured another kind of rope from scribbled or carded wool, which can be afforded at even a less price than hempen ropes, but which will not be so durable as worsted ropes, nor perhaps be capable of being again manufactured; nor would it employ so many hands to manufacture, which, whilst so many people in Yorkshire are in great distress for want of work, should be taken into consideration.

I am told by naval men that the sacking will make very good hammocks, and it will be afforded at the same price as the hempen ones now in use.

I am afraid of being thought too prolix, but I am so much impressed with the importance of the subject, and of the great saving to this country of money heretofore sent to Russia for hemp, and of other great benefits which would arise to this nation by adopting the plan I recommend, that I am induced to solicit the attention of the Society to it, as I am convinced that their recommendation would bring them into general use.

I am, Sir,

Your humble and faithful Servant,

GEORGE WHITWORTH.

London, March 8, 1808.

To C. Taylor, M. D. Sec.

SIR,

I take the liberty of adding some further particulars on the subject which I had the honour of addressing to the

Society. I have lately made several more experiments upon both the rope and sacking, and am now able to speak with a greater degree of certainty respecting them; and after the polite attention I have experienced from the Society, I should think myself greatly blameable if I did not give you every information in my power upon the subject. I have tried at a breaking machine one of the ropes twenty-four feet nine inches long, and three inches three-tenths in circumference; its weight was eight pounds three ounces, and it bore a weight of one ton thirteen hundred three quarters and sixteen pounds without breaking, but was broken by a weight of one ton fourteen hundred one quarter and twelve pounds. I am much obliged to Mr. Stothard, who furnished me with the rope, for his readiness in complying with my wishes. I conceive that for a first attempt this and all the ropes I have exhibited are very good, but the rope-makers in London tell me that they are capable of being made considerably stronger. From the examination of the pile of the broken rope, it appears not to have been sufficiently longitudinally laid, as it stretched to a very great extent, and I suppose, before it broke, was drawn out so as not to be more than two and a half inches in circumference. I am happy to say that the Navy Board, at whose request I furnished some ropes, have desired me to send some wool to the yard at Woolwich, for the purpose of being manufactured there; of course it will there have the advantage of a fair trial, and it will soon be determined whether woollen ropes can be of advantage to the royal navy.

As I have not been at sea, I am not competent to judge with certainty of the merits of either the worsted ropes or sacking for naval purposes, but I will boldly venture to predict, that in many situations familiar to me, wool wil

be

be found very superior to hemp; and it will be a great national benefit if we are at once able to give up hemp to the use of the navy.

Wool used upon my plan will furnish employment to manufacturers, who are now in great need; it will relieve the growers of long wool, by taking an article at a fair price, which must otherwise remain a drug upon their hands, and it will give new life and vigour to our internal commerce. The hammock is also under consideration of the Navy Board, and I have the greatest hope that its use will be adopted. I have the most respectable testimony of the value of the woollen sacking for corn bags, from the gentlemen in the corn market, and which I am happy to say was almost on my part unsolicited. I have sent a fresh specimen of the article for your notice. I saw one of the bags, containing about seventeen pecks of wheat, thrown from the shoulder of a tall man upon a boarded floor, without the least injury being done to the sack; which experiment was considered by the persons present to be a proof of sufficient strength for any purpose for which sacks ought to be used.

The sacking will be particularly useful for the bottom of beds, and in many other situations where hemp has heretofore only had a place. The price of worsted and woollen sacking is near one shilling and sixpence per yard, and hempen sacking from one shilling and three pence to one shilling and four pence per yard, twenty-five inches in width.

The rope will I believe be to hemp as follows, in point of weight and value, new and old, of the same size:

17¼ ounces hemp,	worth, new,	13d.	worth, old,	1d.
12 ounces wool,	do.	12d.	do.	4d.

Raw materials of both articles taken at 84l. per ton.

Every trial I have made corresponds nearly with the above; and when worsted rope is brought to its greatest perfection, I have no doubt but a rope of any given size will be found cheaper in the first instance than a hempen one, which, added to the advantage in the old material, will be a very weighty recommendation.

I put some very small traces into use about a month ago, and on my return home I found them very firm. My servants told me the extreme wet weather had no effect upon them, and that they had this advantage over hempen ones, that they did not stiffen on drying, but were as pliable and soft as before they were wet. A man of great veracity has informed me that he has used a woollen rope wet and dry without any extraordinary care, in turning a cylinder from the axis of a water wheel, and that he has found it to wear much longer than any hempen one had previously done in the same time and situation.

I have given woollen ropes of different sorts to some of my neighbours, and I have most favourable accounts from all of them. I could have sent certificates of their worth under the hands of very respectable men, but I hope in a short time the whole country will be acquainted with their value, as I understand a meeting has been called in this neighbourhood, to consider how far they may be usefully adopted in agriculture, and some commercial departments. I believe it is now fully ascertained, that for turning cylinders in all machinery, wool will wear longer, and perform its office better than hemp; and I think that for cranes, coal heaving, and in every situation where there is much friction, wool will be found more durable. I know from experience that almost any ordinary roper may make a rope sufficiently good for the use of the farmer, and for ordinary purposes, after the wool has been once combed

only;

only; and I wish it to be generally known, that there is no difficulty in altering a loom of almost any description in a short time to a sacking loom; and I am of opinion that some of the coarse wool of this island, not considered as decidedly long, would make very good sacking in part, and very useful rope. I shall now conclude my letter, and shall be very proud to have been in any degree useful to my country. I have certainly given a great portion of labour to the cause, and have been at considerable expenses in promoting an object which I firmly believe to be of much importance at this juncture. I beg leave to tender you my best thanks for the attention you have shown me; and if the Society shall consider my experiments worthy of recommendation, I shall then be fully convinced that my time and attention have been directed to a truly desirable object.

I have the honour to be, Sir,

Your devoted humble Servant,

GEORGE WHITWORTH.

Cuxwold, April 23, 1808.

To C. TAYLOR, M. D. SEC.

CERTIFICATES.

SIR,

WE, the undersigned, have examined the woollen sack exhibited by George Whitworth, Esq. and can see no reason to imagine but that it may be rendered in every respect as useful as hempen ones, and at little, if any, additional price; and under the present situation of this country, with regard to Russia, &c. we think it may prove a discovery of national benefit.

ROBERT and JOHN WILSON.
GILES and HENNINGS.
WILLIAM GILLIES.
MATTRASS and FOTHERGILL.
ROBERT and JOHN HEWETSON.
AUGUSTIN GEORGE, jun.
SAMUEL HOLLINGSWORTH.
CHRIS. DUNKIN and J. HAYS.
W. RANDELL.
MATTHIAS WILKS.
J. and W. BURGESS.

Corn Exchange, Mark Lane,
April 13, 1808.

To C. TAYLOR, M. D. SEC.

SIR,

BY desire of George Whitworth, Esq. I send you the sack which was exhibited on our stand at Mark Lane. I am very sorry we could not get a quantity in time to ship clover seed in this season, as that would have distributed them through every part of the country; and the farmers seeing them, might have employed the weavers in their own neighbourhood to manufacture them for their own use, much lower than by procuring them from one particular neighbourhood, and which is the liberal idea of the inventor.

You will also receive a piece of the rope, which bore one ton thirteen hundred three quarters and thirteen pounds. I attended the experiment, and found the ropers to be of opinion that they could manufacture one from similar materials much better, this rope having been sent from Lincolnshire. I have very little doubt but that this discovery and application of wool will prove highly beneficial to the farmer, and probably of the greatest importance to the country.

I am, Sir,
Your obedient Servant,
JOHN FOTHERGILL.

No. 22, *Colchester Street,*
Tower Hill, London, April 26, 1808.

To C. TAYLOR, M. D. SEC.

SIR,

I FEEL much honoured by the inquiries you have made from me, by desire of her Serene Highness the Margravine of Anspach, respecting the mode of spinning the wool for my sacking; and it gives me great pleasure to have an opportunity of affording any information to a lady so distinguished for her endeavours to promote the interest of this country.

As the warp is made of one description of wool, and the weft of another, it requires a different process to bring the former into worsted, from that which converts the latter into yarn. The worsted is spun from combed wool, upon a machine called by the Yorkshire manufacturers a frame. These, in the factories I have seen, are generally so constructed that a boy or girl can conveniently attend about forty spindles; the worsted thread is afterwards doubled and twisted upon another machine, called a twisting frame, and it is then ready to form the warp. The yarn used for weft is made of very coarse wool, and generally rather short: I believe some of the lowest sorts of Scotch wool have been used for this purpose. The wool is pulled or opened by a machine called the willy, and is afterwards passed through the scribbler; it is then carded by another machine, and is ready for spinning by the common spinning jenny, with which a man or woman, by hand, can spin about forty threads at once, assisted by two or three boys, who supply the cardings. I have probably been more explicit than necessary on the subject, but I wish fully to comply with her Highness' request. As you have obligingly offered to accept any addition to my former communication, I shall now observe, that a considerable contract for hammocks is now executing at Doncaster, and I hope they will prove superior to those made of hemp. The woollen sacks and ropes, as far as they have been hitherto tried, have fully answered expectation. The traces and plough lines are as good to appearance after three months constant use, as when new; and worsted waggon ropes, for binding loads of hay or corn, are much approved of by all my waggoners, and were certainly more to be depended upon in the late hot weather, when the hay was excessive dry, than hempen ones. It was obvious to every one, that the loads bound by woollen ropes were brought home more regular and even than the others. I suppose it was owing to the elasticity of the wool that this was effected. I state this, as I think it will give you satisfaction to hear, that what you had formed a favourable expectation of, answers so well.

It is, in my opinion, the duty of every Englishman to consider early the things we can resort to at a time of necessity.

I remain, Sir,
With the greatest respect,
Your obliged and obedient Servant,
GEORGE WHITWORTH.

Cuxwold, August 6, 1808.
To C. TAYLOR, M. D. SEC.

FIVE GUINEAS *were this Session voted to* MR. PETER TANSLEY, *at the White Horse, Wheeler Street, Spitalfields, for his Improvement in Cutting Silk Shag Edgings, from whom the following Communications were received. An explanatory Engraving is annexed, and the Implement is preserved in the Society's Repository.*

SIR,

IN the latter end of March, 1806, my employer, Mr. Jeffery, of Bow Lane, Cheapside, applied to me with a pattern of silk shag, about six eighths of an inch wide, which he wished to be executed as quick as possible.

Being aware how tedious an operation it was to cut the shag with the trivat, the instrument generally used by the shag weavers for that purpose, I thought I could invent an instrument which would cut it in one-third of the usual time; I therefore drew the plan of one, and gave it to Mr. Baker, a cutler in Artillery Passage, Artillery Street, Spitalfields, to make according to my instructions, which he did, and which answered my expectations in the work.

In October, 1806, I made for the same gentleman a figured shag, one inch and three quarters wide, and cut it with the same instrument, as certified by my employer and his son-in-law. I hope the Gentlemen of the Society will not think me too presuming in offering this improvement to their notice.

I am, Sir, with great respect,
Your obedient Servant,
PETER TANSLEY.

White Horse, Wheeler Street, Spitalfields,
April 28, 1808.

To C. Taylor, M. D. Sec.

Reference to the Engraving of Mr. Peter Tansley's *Implement for Cutting Shag. See Plate I. Figs.* 8, 9.

Fig. 8 shows the steel implement or cutter, as placed or woven within the threads, previous to their being cut with it, the cutting being performed by merely drawing out the knife, the sharp edge of which cuts the threads, and forms the shag by that operation

Fig 9 shows the implement detached from the work, R being the part held in the hand, and S the sharp blade which cuts the threads.

SIR,

This is to certify, that Peter Tansley, of Wheeler Street, is the sole inventor of the cutter for making narrow shag; that its utility is well known; and that I have, within fourteen days, made four hundred of these improved instruments.

W. BAKER,
Working Cutler, 13, *Artillery Passage*,
Bishopsgate Without.

To C. Taylor, M. D. Sec.

Certificates were received from the following persons, stating the very great utility of the instrument, their persuasion of its being superior to any other thing of the kind ever invented, as making the work equally good, with greater ease and in half the time, and that Mr. Peter Tansley is the original inventor.

Thomas Jeffery, 48, Bow Lane, Cheapside.
Thomas Bradley, jun. Chiswell Street.
William Hewitt, 2, Wilson Street, Moorfields.
Thomas Bright, 48, Gutter Lane.
John Farmer, 3, Staining Lane.
W. Ogbun, 11, Beech Street.
Henry Ogbun, Crown Street.
John Ogbun, 75, Sun Street.
Steph. Watters, 37, Wood Street, Cheapside.
John Peter Claret, Hayes Court, Soho.

PAPERS